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ABSTRACT

For the past several years, entering University of Illinois freshmen have been required to participate in a "College Diagnostic Testing Program." A central purpose of this program has been to improve the prediction of course grades and of overall gradepoint averages (GPA) within the various colleges of the university. The unit for which the prediction of course grades and overall GPA has traditionally proved most refractory has been the College of Fine and Applied Arts (FAA). This is assumed to be so because these evaluations include a judgment of the student's exhibited creativity as well as his technical competence. One would expect to find significant relationships between measures of creativity and grades in courses presumably eliciting creative behavior. Therefore, in the fall of 1968 over 300 freshmen in FAA were administered the Figural Test of the Torrance Tests of Creative Thinking during the diagnostic testing. The results show that the Torrance Figural Test has little utility in enhancing the prediction of course grades in FAA. This would indicate that either the test is invalid or that creativity is not rewarded in FAA courses. (HS)

RELATIONSHIPS BETWEEN FIGURAL CREATIVITY AND
GRADES IN A COLLEGE OF FINE AND APPLIED ARTS

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For the past several years, entering University of Illinois freshmen have been required to participate in a "College Diagnostic Testing Program." A central purpose of this program has been to improve the prediction of course grades and of overall grade-point averages (GPA) within the various colleges of the university. The unit, for which the prediction of course grades and overall GPA has traditionally proved most refractory, has been the College of Fine and Applied Arts (FAA). For example, Bowers (1963) presented data comparing the predictability of first semester GPA's, by college, at the University of Illinois. FAA had the lowest zero-order correlation between first semester GPA and American College Testing Program (ACT) Composite scores ($r = .30$). When high school rank, sex, and ACT Composite were yoked together as predictors, the multiple correlation was only .45. By contrast, the multiple correlation (with the same three predictors) for the colleges of Agriculture and Education was .65.

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In many studio art courses offered by FAA, course grades are based upon the evaluation of art products by a faculty jury. Presumably, these evaluations include a judgment of the student's exhibited creativity as well as his technical competence. It might also be assumed that the creative component is considered in assigning grades in musical performance courses, architecture and landscape architecture courses, and advanced urban planning courses.

One would expect to find significant relationships between measures of creativity and grades in courses presumably eliciting creative behavior. Therefore, because it was hoped that a measure of creativity might enhance the

prediction of grades in certain courses, in the fall of 1968 over 300 freshmen in FAA were administered the Figural Test (Form B) of the Torrance Tests of Creative Thinking (Torrance, 1966 a) during the diagnostic testing. The figural test was chosen to obtain a creativity measure which was independent (at least logically) of verbal ability. All completed tests were returned to Personnel Press for scoring. The criteria of course grades and first semester grade-point averages (GPA), as well as American College Testing Program (ACT) scores, were obtained for most of the students.

Description of the Instrument

In the Torrance Test of Creative Thinking, "Thinking Creatively with Pictures (Form B)," scores on the four figural variables are derived from an analysis of responses to three activities (types of items or stimuli). The four variables are:

fluency, the number of relevant responses offered; flexibility, the number of spontaneous shifts from one category of meaning to another; originality, the relative infrequency of the responses offered; and elaboration, the detail and specificity of the responses (Wallach, 1968, p. 274).

The three activities are: Picture construction; Incomplete Figures; and Repeated Figures.

Results

Zero-order correlations (validity coefficients), generated by a missing data routine, relating the four figural creativity variables and various criteria are reported in Table 1. Correlations among the four figural creativity variables and the ACT scores are also found in Table 1.

Insert Table 1 about here

Only one validity coefficient, of the 68 generated, was significant at the .05 level. By chance alone, two or three significant correlations would be expected.

One might ask whether there were statistically significant relationships between grades and figural creativity variables over and above the relationships between grades and scholastic aptitude (as measured by ACT Composite). In general, the answer is no. This negative response is supported by the following data. First, in a step-wise multiple regression routine with first semester GPA as the criterion and five ACT scores (English, Mathematics, Natural Science, Social Science, and Composite) and the four Torrance figural scores as predictors, the first variable entered was ACT English, the second was ACT Natural Science, and third was Torrance Originality. (Two hundred and eighty-two subjects had complete data on these variables.) With first semester GPA, the zero-order correlations of these three predictors were .26, .24, and .08 respectively. Nothing was gained by using these three predictors in linear combination. By adding ACT Natural Science to ACT English, a multiple correlation of .28 was generated. This increase over the zero-order correlation of .26 was nonsignificant ($F = 3.64$, $df = 1/279$; $p > .05$). Moreover, when both ACT Natural Science and Torrance Originality were teamed with ACT English, the change in the size of the multiple correlation over the zero-order correlation remained nonsignificant ($F = 2.93$; $df = 2/278$; $p > .05$). Second, even though ACT Composite (usually, a best predictor) was significantly correlated with grades in four of the eleven courses (Freehand Drawing, Theory of Music, Basic Music Literature, and Geometry for Architects), the increment to R obtained by adding the four Torrance scores as predictors was nonsignificant. The multiple R obtained from a linear combination of ACT composite and the four Torrance scores was nonsignificant for the remaining courses.

It also would see that, in this sample ($N = 301$), Fluency and Flexibility were assessing the same factor ($r = .90$). Originality correlated .25 and .26 with Fluency and Flexibility respectively. Elaboration correlated .41 with Fluency and .36 with Flexibility.

A multiple discriminant analysis and a multivariate analysis of variance (MANOVA) were performed to determine whether the three largest curricular groups (Architecture, Art, and Music) in FAA could be distinguished on the basis of the four figural creativity variables. The number of students in Landscape Architecture and Urban Planning was too small to be included. A preliminary test of the homogeneity of dispersion matrices [similar in intent to the homogeneity of variance test used in analysis of variance] resulted in a significant F statistic ($F = 1.63$; $df = 20/191,578$; $p < .05$). This test is found in Cooley and Lohnes (1962, p. 62-63). Because the hypothesis that the dispersion matrices were homogeneous was rejected, the multivariate analysis of variance results may be somewhat suspect. Nevertheless, the hypothesis that the group centroids (means of the three curricular groups on the four figural variables) were equal was rejected (Wilks's Lambda = .89; $F = 5.02$; $df = 8/640$; $p < .01$). Means and standard deviations of the figural creativity variables, by curricular grouping, are shown in Table 2. Interestingly, all univariate analyses of variance, comparing the three curricular groups on the figural variables one at a time, were significant (for Fluency, $F = 3.25$; $df = 2/323$; $p < .05$; for Flexibility, $F = 5.15$; $df = 2/323$; $p < .01$; for Originality, $F = 3.28$; $df = 2/323$; $p < .05$; for Elaboration, $F = 5.07$; $df = 2/323$; $p < .01$).

 Insert Table 2 about here

Two discriminant functions were significant (for I, $\chi^2 = 397$, $df = 8$, $p < .01$; for II, $\chi^2 = 19$, $df = 3$, $p < .01$). The normalized vector, scaled vector, latent roots, and percent of trace for each function are presented in Table 3. It can be seen that, of the two, the first function accounted for most of the variance.

 Insert Table 3 about here

In Figure 1, the group Centroids are plotted in two dimensional discriminate space. The set of weights comprising the scaled vectors indicate that on the first function, Art students are differentiated by a relatively low score on Flexibility, with higher scores on Elaboration, Originality, and Fluency, in that order of importance. Music students tend to show the opposite pattern, with Architecture in an intermediate position. The highly correlated variables, Fluency and Flexibility, do most of the differentiating on the second dimension. Music and Art students are relatively higher on the former variable, while Architecture students are relatively higher on the latter.

 Insert Figure 1 about here

Discussion

Even in educational research, it is uncommon for less than two percent of a large number of validity coefficients (using grades and ability measures as criteria) to be statistically significant. This situation is even more peculiar because in many of the courses creativity is considered in assigning grades. Perhaps as a rationalization, Torrance (1966 a) has cautioned that:

Although many investigators have sought to validate the Torrance Tests of Creative Thinking and similar instruments by correlating scores derived from them with measures of educational achievement, there are many reasons for not expecting high correlation between creativity variables and educational achievement variables (p. 47).

This warning might be more palatable had not Torrance (1966 a) also suggested that:

If measures of achievement took into consideration creative applications of information and other kinds of creative achievement and/or if subject matter were acquired in creative ways, one could expect high correlations between creative thinking measures and achievement (p. 47).

In summary, the Torrance Figural Test (Form B) of Creative Thinking would seem to have little utility in enhancing the prediction of course grades in one College of Fine and Applied Arts. The scores did significantly discriminate among curricular groupings. While these results may indicate some usefulness

of the test by guidance counselors, other tests made for this purpose (e.g., the Kuder and Strong) would probably do better.

If grades in certain fine and applied arts courses represent, in part, an evaluation of a student's exhibited creativity, the absence of significant correlations between the Torrance Figural Test (Form B) scores and course grades offers little support for the construct validation of those tests. It is also possible that creativity is not rewarded.

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TABLE I

Correlations of the Torrance Figural Test (Form B)
Creativity Scores with Various Criteria (Grades)
and Predictors (ACT Scores)

	Figural Creativity Variables				
	Fluency	Flexibility	Originality	Elaboration	N
Criteria					
Orientation to Arts Grades	.145	.191	.146	.184	84
Drawing Grades	.035	-.057	.069	.150	84
Design Grades	.127	.049	.032	.127	84
Drawing Theory Grades	.021	-.058	.052	.183	81
Freehand Drawing Grades	-.019	-.076	.103	.137	147
Theory of Music Grades	-.174	-.166	.222	.056	57
Basic Music Literature Grades	-.085	-.086	.090	.116	44
Piano Grades	.053	.056	-.022	.287	37
Voice Grades	-.034	-.098	.166	.052	25
Geometry for Architects Grades	.109	.123	-.031	.086	144
Architectural Design Grades	.064	.107	.120	.034	48
1st Semester GPA	.062	.082	.086	.117*	301
Predictors					
ACT English	.089	.086	.027	.103	282
ACT Math	-.107	-.042	.041	.055	282
ACT Social Science	.020	.009	.015	.078	282
ACT Natural Science	-.037	-.075	.065	.081	282
ACT Composite	-.014	-.008	.050	.102	282

* $p < .05$

T. E 2

Torrance Figural Test (Form B) of Creativity:

Means and Standard Deviations of Four Variables for Three Curricula

Variable	Architecture (N = 167)	Art (N = 84)	Music (N = 75)
	Group Means		
1. Fluency	13.15	13.10	15.00
2. Flexibility	11.05	10.58	12.73
3. Originality	19.22	21.90	17.61
4. Elaboration	62.21	69.75	56.64
	Group Standard Deviations		
1. Fluency	5.48	5.38	5.97
2. Flexibility	4.19	4.31	5.26
3. Originality	10.71	11.73	9.90
4. Elaboration	25.94	29.33	22.87

TABLE 3

Torrance Figural Test (Form B) of Creative Thinking:

Roots and Vectors of $W^{-1} A$

Variables	Normalized Vectors		Scaled Vectors	
	I	II	I	II
1. Fluency	.1028	.8399	10.2989	84.1388
2. Flexibility	-.9703	-.5349	-78.2145	-43.1192
3. Originality	.1844	.0911	35.8074	17.6899
4. Elaboration	.1180	.0074	55.5804	3.4706
	Latent Roots		Percent of Trace	
	$\lambda_1 = .1229$		95.3920	
	$\lambda_2 = .0059$		4.6081	

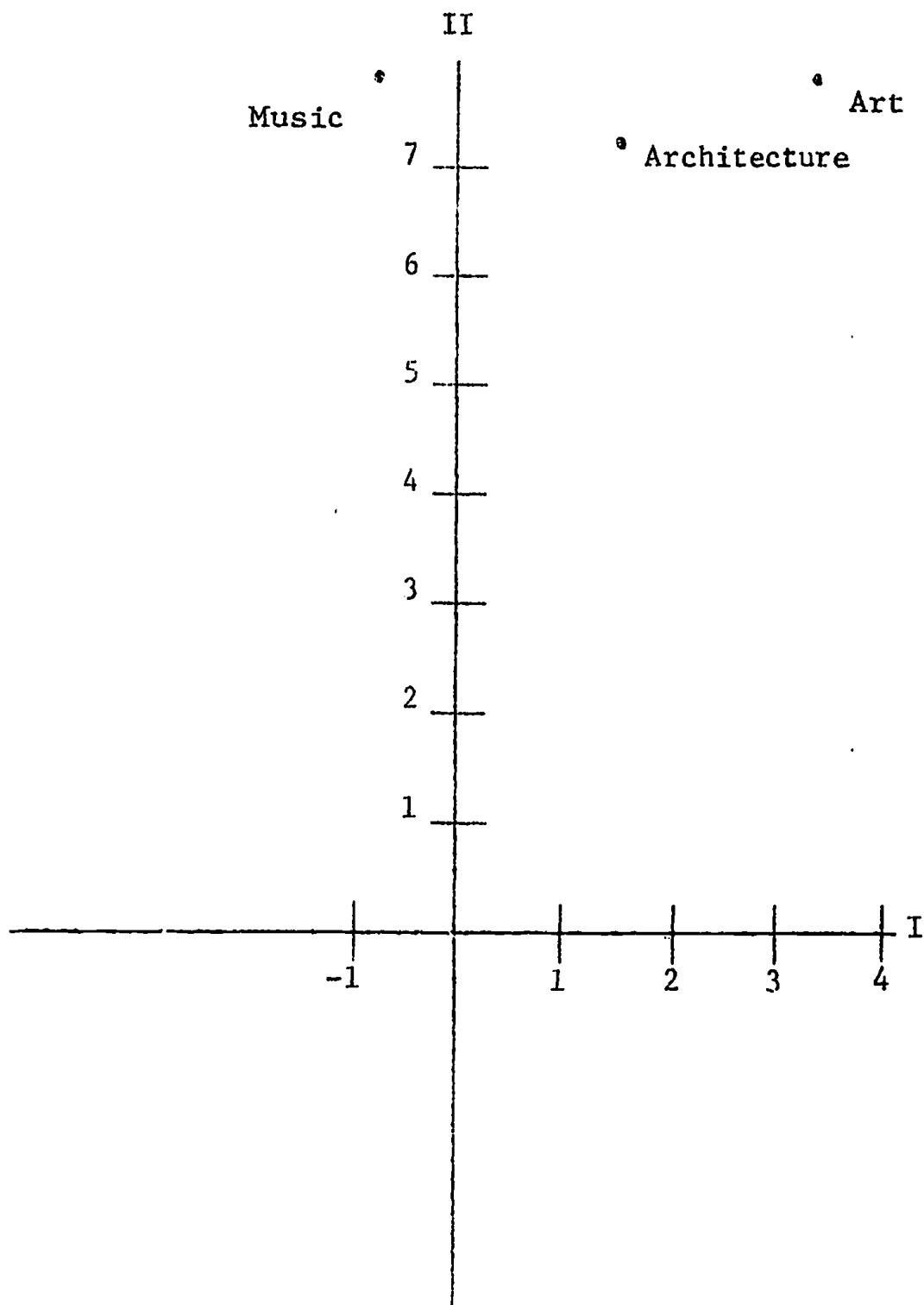


Figure 1. Architecture, Art, and Music centroids in the discriminant space derived from four Torrance Figural Test (Form B) of Creative Thinking variables. These variables are Fluency, Flexibility, Originality, and Elaboration.